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SCIENTIFIC INFORMATION REPORT

Physics and Mathematics

(25)

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SCIENTIFIC INFORMATION REPORTPhysics and Mathematics (25)

This is a serialized report consisting of unevaluated information prepared as abstracts, summaries, and translations from recent publications of the Sino-Soviet Bloc countries. It is issued in seven series. Of these, four, Biology and Medicine, Electronics and Engineering, Chemistry and Metallurgy, and Physics and Mathematics, are issued monthly. The fifth series, Chinese Science, is issued twice monthly; the sixth series, Organization and Administration of Soviet Science, is issued every 6 weeks; and the seventh series, Outer Mongolia, is issued sporadically. Individual items are unclassified unless otherwise indicated.

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I. PHYSICS

Atomic and Nuclear Physics1. Problem of Anomaly During the Decay of μ^- Mesons

"Problem of Anomaly During the Decay of μ^- Mesons in Mesic Atoms of Transition Metals of the Iron Group," by L. B. Yegorov et al, Joint Institute for Nuclear Research; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 4, Oct 62, pp 1149-1153

Relative measurements are made of the probabilities of μ^- -meson decay in mesic atoms of iron and zinc, as well as in nickel and copper, by scintillator counters. The results of the measurements indicate an absence of anomaly observed by a number of authors. Equality within the limits of errors of the experiment for the yield of gamma rays from the above-mentioned targets indicates that the instrument effect noted by some authors is not the reason for the anomaly observed.

2. Fine Structure of Pu^{239} α Radiation

"Fine Structure of Pu^{239} α Radiation," by S. A. Baranov, V. M. Kulakov, and S. N. Belen'kiy; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 4, Oct 62, pp 1135-1139

An analysis of the Pu^{239} α spectrum makes it possible to determine the existence of more than 20 fine structure α groups, most of which have been detected for the first time. A possible interpretation of the energy levels of the U^{235} nucleus which indicates the existence of a new level band based on the $5/2^+[633]$ orbit is discussed. The scheme of the U^{235} energy level is given.

3. Measurement of γ -Ray Polarization

"Measurement of the Polarization of γ Rays From the Reaction $\text{Si}^{30} (p, \gamma) \text{P}^{31}$," by P. M. Tumakin, Physicotechnical Institute, Academy of Sciences Ukrainian SSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 4, Oct 62, pp 1140-1145

Photographic emulsions impregnated with heavy water are used to measure the plane polarization of γ rays from the reaction $\text{Si}^{30} (p, \gamma) \text{P}^{31}$. For energies $E_p = 773, 939$, and 979.5 Kev, the transitions from the resonance levels to the ground level of the nucleus P^{31} ($3/2^+ \rightarrow 1/2^+$) were investigated. The coefficients of the mixture for different types of transitions were shown to be 2.3, 0.15, and 1.0, respectively. For the energy $E = 1393$ Kev, the transition to the first excited level 1.26 Mev ($3/2^+$) is investigated. Spin and parity of the resonance level came out to $5/2^+$ and $\delta = 0.02$.

4. Dependence of Kinetic Energy on α Particles

"Dependence of the Kinetic Energy of Fragments on the α Particle Energy During Ternary Fission of Uranium," by Z. I. Solov'yeva and R. A. Filov; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 4, Oct 62, pp 1146-1148

A study is made of the dependence of the total range of fragments in the ternary fission of uranium by thermal neutrons on the energy of long-range α particles. The data obtained are used to discuss the mechanism of ternary fission.

5. Angular Distribution of π Mesons

"Angular Distributions of π Mesons Produced in Nucleon Collisions and the Hypothesis of Isotopic Invariance," by Lui Ming and Yu. D. Prokoshkin, Joint Institute for Nuclear Research; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 4, Oct 62, pp 1202-1207

The angular distribution of π^0 mesons produced in neutron-proton collisions at ≈ 660 Mev is measured. This is compared with the angular distributions of π mesons found earlier to verify the hypothesis of isotopic invariance.

6. Azimuthal Angular Distribution of Secondary Particles

"Azimuthal Angular Distribution of Secondary Particles Produced in High Energy Interactions," by A. P. Mishakova and B. A. Nikol'skiy; Moscow, *Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki*, Vol 43, No 4, Oct 62, pp 1213-1222

By the method of paired angular correlations, a study is made of the azimuthal angular distributions of secondary particles produced in interactions of high energy nucleons. It is concluded that the azimuthal angular distributions are closed to isotropic. The azimuthal angular distributions of secondary particles in cosmic showers are analyzed from the viewpoint of validity of the model of formation of an intermediate excited state and the model of "fire balls." It is concluded that if the "fire ball" model holds, the direction of motion of "fire balls" coincides with the direction of motion of the colliding particles; the model of intermediate excited state (with large magnitude of angular momentum) contradicts the isotropy of the azimuthal angular distribution.

7. π^0 Meson Production

"Production of π^0 Mesons in the Coulomb Field of the Nucleus," by V. V. Barmin et al, Institute of Theoretical and Experimental Physics, Academy of Sciences USSR; Moscow, *Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki*, Vol 43, No 4, Oct 62, pp 1223-1230

A xenon bubble chamber is used to investigate the effect of production of π^0 mesons by 2.8-Bev/c π^- mesons in the coulomb field of the xenon nucleus ($\pi^- + \text{Xe} \rightarrow \pi^- + \pi^0 + \text{Xe}$). The cross section for this reaction in the interval of escape angles θ of the π^- mesons from 3 to 30° is $\sigma_c \approx 4.4 \pm 1.6$ mbn. The angular distribution of the reaction has a sharp peak in the region of angles $\theta < 10^\circ$. A relation is derived connecting the cross section σ_c with cross section of the photoprocess $\gamma + \pi^- \rightarrow \pi^- \pi^0$, which was found on the average to be 0.6 ± 0.2 mbn in the interval $4m^2 \approx \omega \approx 2lm^2$ (ω is the total energy of the generated mesons in their center of mass system).

8. Reactions of Total Decay of Nuclei

"Reactions of Total Decay of Nuclei," by Yu. A. Berezhnoy et al.; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 4, Oct 62, pp 1248-1252

The reaction of total decay of a colliding carbon nuclei into α particles ($C^{12} + C^{12} \rightarrow 2\alpha$) arising during irradiation of nuclear emulsions with 115-Mev carbon ions is studied. The angular and energy distributions of α particles and the excitation function are compared with calculations obtained from the statistical model of direct nuclear decay.

9. Polarization Effects in π Mesons

"Polarization Effects in the Radiation Decay of π Mesons," by S. A. Gadzhiev and A. I. Mukhtarov, Azerbaydzhan State University; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 4, Oct 62, pp 1275-1280

The polarization effects in the decay $\pi \rightarrow e(\mu) + v + \gamma$ for variants V, A of weak direct interaction are investigated. Selection rules are found for the correlations of longitudinal polarizations of the spin of decay products.

10. Possible Decay of New Mesons

"Possible Decay of New Mesons," by I. Yu. Kobzarev and L. B. Okun', Institute of Theoretical and Experimental Physics, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 4, Oct 62, pp 1288-1295

Evaluations of the probabilities of decay of unstable mesons are given. It is shown that small widths of decays in certain cases may be accounted for by purely kinematic factors. Small widths of pion decay result in the fact that radiative decays (with the emission of photons) may be substantial.

11. Determining the Amplitude of π Meson Production

"Determination of the Amplitude of π Meson Production in the Collision of a Neutrino With a Nucleon, by Means of Dispersion Relations," by Nguyen Van-hien, Joint Institute for Nuclear Research; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 4, Oct 2, pp 129-1300

The properties of the amplitude of π meson production in the collision of a neutrino with a nucleon are studied, the one dimensional dispersion relations for these amplitudes are written, and solutions of the integral equations on the assumption of resonance P waves (33) and by disregarding the contribution of other waves to the imaginary part of the amplitude are obtained. A comparison of the results obtained with experiment made it possible to verify the V-A theory of weak interaction.

12. Stable Betatron Oscillations

"Stable Betatron Oscillations in a Nonlinear Magnetic Field," by Yu. F. Orlov, Institute of Physics, Academy of Sciences Armenian SSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 4, Oct 2, pp 1308-1314

The stability of betatron oscillations in an annular axial symmetrical magnetic field with maximum (or minimum) along the radius r is examined. In a linear approximation with respect to vertical z oscillations, a potential well for r -oscillations is meaningful, inside which there exist bonds of stability for z . The nonlinearity of small z oscillations does not violate the stability. Acceleration without violation of stability is possible with strong focusing at the start of acceleration.

13. $\pi\pi$ Interaction on s and p Waves

"Effect of $\pi\pi$ Interaction on s and p Waves of πN Scattering," by P. S. Isayev and V. A. Meshcheryakov, Joint Institute for Nuclear Research; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 4, Oct 2, pp 1339-1348

The effect of $\pi\pi$ interaction in s and p wave of πN scattering based on Mandelstam representation is taken into account. Transition to partial waves is made by means of combining dispersion relations for before and after scattering. The equation for s^- and p^- waves is compared with experimental data on the phases of πN scattering. Satisfactory agreement is obtained up to incident π meson energy of ~ 500 Mev in the laboratory coordinate system. It is shown that $\pi\pi$ interaction significantly affects the energy dependence of the s^- and p^- $1/2$ phases even at low energies and that up to ~ 400 Mev (in the laboratory system) produces but a slight effect on the behavior of p^- $3/2$ phase.

14. Phase Shift Analysis of Nucleon-Nucleon Scattering

"Phase Shift Analysis of Nucleon-Nucleon Scattering at Energies of 40, 95, 147, and 310 Mev," by Yu. M. Kazarinov and I. N. Silin, Joint Institute for Nuclear Research; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 4, Oct 62, pp 1385-1393

Simultaneous phase shift analysis of np and pp scattering is carried out. The phase shift sets obtained are produced. The π meson nucleon interaction constant derived is consistent with the value 0.08. An attempt to determine the π meson mass from data on nucleon-nucleon scattering is made. The value obtained for the mass does not contradict the value known.

15. Cosmic Muons and Photons and Hyperon Hypothesis

"Origin of High Energy Cosmic Muons and Photons and the Hyperon Hypothesis," by Yu. D. Kotov and I. L. Rozental, Moscow Engineering Physics Institute; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 4, Oct 62, pp 1411-1418

The differential spectrum of 10^{11} - 10^{14} ev cosmic muons is calculated on the assumption that the particle carrying away most of the energy of the primary is a hyperon. The spectrum obtained is in good agreement with experimental data. However, the negative excess calculated contradicts experimental data on energy of ~ 100 Bev. It is shown that this discrepancy can be eliminated assuming that the distribution of produced hyperons by charge sign is due to statistical weight in isotopic space. The differential spectrum is calculated also for gamma quanta of 10^{11} - 10^{11} ev at great height.

16. Attenuation of Electromagnetic Waves

"Attenuation of Electromagnetic Waves in an Nonhomogeneous Medium Related to Transition Radiation," by V. Ya. Eydman, Radiophysics Institute, Gor'kiy State University; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 4, Oct 62, pp 1419-1423

It is shown that in a nonhomogeneous medium, electromagnetic waves can be absorbed as a result of a change in the properties of the medium. The relation between this mechanism of wave absorption and the transitional radiation from the charged particles of the medium is established by using the Kirchhoff theorem.

17. Probability of Certain Processes and Neutral Currents in Weak Interactions

"Low Probability of the Processes $\mu^- e + \gamma, \mu^- e + e + e$ and Neutral Currents in Weak Interactions," by B. Pontecorvo, Joint Institute for Nuclear Research; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki. Vol 43, No 4, Oct 62, pp 1521-1523

It is pointed out that the introduction of a symmetric neutral currents, in addition to charged currents in weak interactions, makes it possible to obtain a very small probability of the decay processes $\mu^- e + \gamma, \mu^- e + e + e$ even if there is only one kind of neutrino in nature.

18. Soviets Make New Atmospheric Nuclear Tests

Istanbul, Cumhuriyet, 17 Dec 62

On 15 December, the Swedish Institute of Seismography noted a Soviet nuclear explosion which occurred at high altitude in the vicinity of Novaya Zemlya Island. The institute stated that the explosion was approximately 5 megatons in intensity. Swedish scientists are of the opinion that this explosion marks the beginning of a new series of tests. The Swedish defense ministry, however, offered no interpretation regarding the explosion.

19. Emission of Delayed Protons

"Emission of Delayed Protons in a Positron Decay of Neutron-Deficient Nuclei," by V. I. Gol'danskiy, Institute of Chemical Physics, Academy of Sciences USSR; Moscow, Doklady Akademii Nauk SSSR, Vol 146, No 6, Oct 62, pp 1309-1311

In the literature of the past few years, the possibility of the emission of delayed protons after positron β -decay of the nuclei of neutron-deficient isotopes of light elements (see, for example, V. A. Karanaukhov and N. I. Tarantin, ZhETF, Vol 39, 1960, p 1106, where references to previous works are given) has been considered repeatedly. In this connection, however, specific estimates of the area of abundance of this phenomenon, a list of isotopes for which it is observed and the half-life determining the delayed proton activity of positron β -decay have been given.

Similar estimates may be obtained with sufficient accuracy on the basis of a method developed previously by the author to determine the properties of neutron-deficient isotopes of light nuclei which was used in predicting two proton radioactivity and in confirming the date on the newly discovered isotopes Mg^{22} , Si^{26} , and Si^{30} during the last 2 years.

20. Performance of Linear Electron Accelerator

"Energy and Phase Characteristics of a Linear Electron Accelerator with Phase Velocity Equal to the Velocity of Light," by I. F. Kharchenko, I. A. Grishayev, and A. M. Nekrashevich; Kiev, Ukrains'kiy Fizichnyy Zhurnal, Vol 7, No 10, Oct 62, pp 1051-1061

A curve-analysis method of calculation of the dynamics of longitudinal motion of electrons and the energy performance of a 7-Mev linear electron accelerator with phase velocity equal to the speed of light is presented. Prior bunching of electrons was used to improve the parameters of the accelerator. It is shown that performance of a linear accelerator of this kind is not inferior to that employing variable phase velocity. On the basis of this calculation, a linear electron accelerator whose output parameters were in good agreement with calculations was built.

21. Inelastic p-n Interaction

"Inelastic p-n Interaction at Energies of 9 Bev," by V. A. Botvin et al., Institute of Nuclear Physics, Academy of Sciences Kazakh SSR; Moscow, Doklady Akademii Nauk SSR, Vol 146, No 4, Oct 62, pp 785-788

Experimental data obtained by the authors on 9 Bev inelastic p-n interactions and their possible theoretical interpretation are given. The study of inelastic p-n interactions was conducted in an emulsion pile which was irradiated by protons in the internal beam of the proton-synchrotron of the Joint Institute for Nuclear Research. Of all the recorded cases of interaction, only those which satisfy the selection criteria for proton-neutron interactions were selected for the analysis. The experimental method and the treatment of the results obtained are analogous to those used earlier. A total of 236 cases of inelastic p-n interactions were selected for the analysis.

22. U^{238} Resonance Shielding Effect

"Shielding Effect of U^{238} Resonances on U^{235} Resonance Absorption," by T. V. Golashvili and I.M. Kisil'; Moscow, Atomnaya Energiya, Vol 13, No 5, Nov 62, pp 435-439

The problem of the mutual effect of U^{238} and U^{235} resonance absorption inside of the unit where the resonance absorption is caused mainly by the volumetric absorption is examined. Theoretical calculations and experiments show that the resonance absorption of U^{235} in the epithermal energy region for natural metallic and 10% uranium depends on the effect of the U^{238} resonance levels.

It is possible to perform similar calculations for other elements.

23. Regularity of Gamma Radiation Propagation

"Some Regularity of Gamma Radiation Propagation Along a Boundary of Two Media," by B. P. Bulatov; Moscow, Atomnaya Energiya, Vol 13, No 5, Nov 62, pp 440-445

Regularity of gamma radiation propagation ($0.33 \leq E \leq \sim 1.25$ Mev) along a boundary of two media is investigated experimentally. It is established that radiation scattering is generated mainly by narrow beams of the primary radiation. The effective scattering surface is included inside the circle with a radius of $r \leq 10 h$ (when $h \leq z$). Contribution to the general energy of the gamma radiation scattered in a medium increases with respect to the angles of incident of the primary "narrow" beams $\alpha \approx 80-88^\circ$ and then steadily decreases.

The effective dimensions of the surface from which the quanta of the scattered radiation of the isotopic sources located on the surface of the scattering material appear in real half-space are estimated.

The energy flux of the scattered radiation was measured by a gas counter of practically constant sensitivity to the quanta of various energy.

24. Beam Loading Effect on Linear Electron Accelerator

"Effect of Beam Loading on the Characteristics of a Linear Electron Accelerator," by E. L. Burshteyn and G. V. Voskresenskiy; Moscow, Atomnaya Energiya, Vol 13, No 5, Nov 62, pp 446-453

The secondary field which originates by moving bunches of particles in decelerating structures is found. The main properties of linear electron accelerators which are explained by taking into account the effect of beam loading are analyzed. The operation of a linear accelerator in the steady state and transitional modes and under a load of short-term pulses is examined in detail.

25. Effect of Temperature on Diffusion Length and Scattering Cross Section

"Effect of Temperature on Diffusion Length and Scattering Cross Section of Thermal Neutrons in Graphite," by I. F. Zhezherun and Ye. N. Korolev; Moscow, Atomnaya Energiya, Vol 13, No 5, Nov 62, pp 454-457

The effect of the warming-up of graphite on the diffusion length and the effective scattering cross section of thermal neutrons is studied. It is determined that in the temperature range 15-350°C the diffusion length changes mainly according to the role $1/v$ for the absorption cross section. A small deviation from this law is connected with an increase in the scattering cross section for a warming-up of 0.5 millibarn/degree.

26. Burn-Up Determination in Fuel Rods

"Determination of Burn-Up in Fuel Rods With a Magnetic Gamma Spectrometer," by L. V. Groshev and A. M. Demidov; Moscow, Atomnaya Energiya, Vol 13, No 5, Nov 62, pp 458-466

The use of a magnetic Compton spectrometer to determine the burn-up of fuel rods without their destruction is proposed. The burn-up is determined according to the intensity of the gamma lines of the fission products. It is possible to use the gamma line Nd^{144} with $E_{gamma} = 2.19$ Mev as one of these lines; the rate of the intensity decay which is determined by the half life of Ce^{144} is equal to 284 days.

27. K Type Nuclear Emulsion Used in Dosimetry

"Use of "K" Type Nuclear Emulsion for Personal Dosimetry of Fast Neutrons," by L. S. Zolin, V. I. Lebedev, and M. I. Salatskaya; Moscow, Atomnaya Energiya, Vol 13, No 5, Nov 62, pp 467-471

A method is described for personal monitoring of 0.5-15 Mev neutron doses. A type "K" domestic photoemulsion placed in a special correcting packet which provides for actual independence of the number of tracks in the emulsion per unit dose from the neutron energy in the interval given in used as a doector. The sensitivity of the method is 4×10^{-4} track/neutron for Po-Be; the accuracy of the measurement of the permissible monthly dose is $\pm 20\%$.

28. Stationary State of Charged Particles

"Stationary State of Axial Symmetrical System of Charged Particles," by O. I. Yarkovoy; Leningrad, Zhurnal Tekhnicheskoy Fiziki, Vol 32, No 11, Nov 62, pp 1285-1290

A self-consistent collision-free system of charged particles of the type having axial symmetry is investigated. The distribution function is taken depending only on the two integrals of motion known in this case for an individual particle. The nonlinear system of equations is obtained for the self-consistent field under the assumption that all particles have equal integrals of motion. The possibilities of formulating a general solution for this system are considered. The state limited by all three measurements is found specifically for the densities required in workable plasma installations.

Several related problems (for example, the state with a charge which is compensated to the necessary degree by heavy oppositely charged particles, etc.) may be solved in a similar fashion.

29. Focusing of Charged Particles

"Focusing of Charged Particles by One Straight Boundary of an Homogeneous Magnetic Field," by V. R. Saulit; Leningrad, Vestnik Leningradskogo Universiteta, No 16, Seriya Fiziki i Khimii

The focusing properties of a homogeneous magnetic field whose range of existence is limited by one straight line are examined. In addition, it is assumed that the source of charged particles is situated outside the magnetic field.

Plasma Physics30. Coefficients of Friction and Diffusion in a Plasma

"Coefficients of Dynamic Friction and Diffusion in a Plasma," by A. G. Sitenko and Chien Yu-t'ai, Kharkov State University imeni A. M. Gorkiy; Leningrad, Zhurnal Tekhnicheskoy Fiziki, Vol 32, No 11, Nov 62, pp 1324-1332

Processes of dynamic friction and diffusione in a plasma are examined. General formulas expressed in terms of spectral distribution for the fluctuations of a longitudinal electrical field in a plasma are derived for the coefficient of dynamic friction and for the coefficients of diffusion. The calculations of the coefficients for the dynamic friction and diffusion of a two-temperature electron-ion plasma are reduced. The vital role of the motion of ions in friction and diffusion processes is shown. The relaxation time of a two-temperature plasma is determined. The effect of an external constant magnetic field is taken into account.

31. Plasma Instability in a Strong Magnetic Field

"Development of the Electrostatic Instability of a Plasma in a Strong Magnetic Field," by A. A. Vedenov and Ye. P. Velikhov; Moscow, Doklady Akademii Nauk SSSR, Vol 146, No 1, Sep 62, pp 65-68

The development of the electrostatic instability in a completely ionized, rarefied plasma is examined, assuming that the constant magnetic field in which the plasma exists is so great that the ratio of the gas pressure nT to the magnetic $H^2/8$ and the frequencies which develop oscillations to the gyrofrequency are small (that is $\Omega_H = eH/Mc$ for ion and $H = eH/mc$ for electron Langmuir oscillations). In addition, the electric fields of the oscillations are potential, and disturbances of the magnetic field are missing.

32. Transverse Magnetic Field Effect

"Effect of a Transverse Magnetic Field on a Toroidal Electric Discharge," by L. A. Artsimovich and K. B. Kartashev; Moscow, Doklady Akademii Nauk SSSR, Vol 146, No 6, Oct 62, pp 1305-1308

Through an investigation of strong current pulsed charges in toroidal chambers with a stabilizing longitudinal magnetic field in Tokamak type installations, it was discovered that in the working modes where the highest conductivity and temperature of the plasma are reached, the oscillogram of a charged current during the first half period of the voltage has the shape shown in a diagram. Initially, the reason for such a curved shape in the current oscillogram seemed vague. At present, the shape indicated for the charged pulse is considered fixed and is directly connected to the actual motions of a plasma column where its large radius R changes.

33. Effect of Local Disturbances of Plasma Confinement

"Effect of Magnetic Field Local Disturbances on Plasma Confinement in a Magnetic Adiabatic Trap," by N. N. Brevnov and Yu. F. Tomashchuk; Moscow, Atomnaya Energiya, Vol 13, No 5, Nov 62, pp 421-428

In experiments with the magnetic adiabatic trap "Ogrenoka," it was discovered that the escape of fast ions in the plug and on the wall of the chamber originates mainly from the region of arrangement of the magnetic channel. The cause of this escape is the scattering of ions in the local disturbance of the magnetic field created by the magnetic channel. The magnitude and the nature of the disturbance are measured. It is found that substituting the magnetic channel with an electrostatic channel brings a sharp decrease in the current of fast ions leaving the plug and the wall. In addition, there is no region from which primary flights of ions originate. Several parameters of the scattering of fast ions on similar disturbances were measured by creating a controlled dipole type local disturbance.

34. Low Pressure Plasma Stability

"Stabilization of a Low Pressure Plasma by a High Frequency Field," by T. F. Volkov and B. B. Kadomtsev; Moscow, Atomnaya Energiya, Vol 13, No 5, Nov 62, pp 429-434

The possibility of stabilizing the boundary of a low pressure plasma situated in a static, crimped magnetic field by a high frequency field is examined. It is shown that to have stability it is necessary for

the pressure of the high frequency field to be lower than the pressure of the plasma.

35. Stationary Longitudinal Oscillations of a Plasma

"Stability of Stationary Longitudinal Oscillations of a Plasma," by V. N. Orayevskiy and R. Z. Sagdeyev; Leningrad, Zhurnal Tekhnicheskoy Fiziki, Vol 32, No 11, Nov 62, pp 1291-1296

A method which makes it possible to investigate the stability of nonlinear, undamped, periodic motions of a plasma without too large an amplitude is described. The method is used to investigate the stability of nonlinear, longitudinal electron and ion oscillations of a plasma. The rising instabilities suggest the decay of quasi-particles. Criteria of instability are obtained. It is shown that the ion oscillations are stable with respect to the excitation of arbitrary longitudinal oscillations.

The electron longitudinal oscillations are unstable with respect to the simultaneous excitation of longitudinal ion and electron oscillations (with another frequency). Additional instability of the electron longitudinal waves appears in a plasma with a magnetic field. They are unstable with respect to the excitation of two transverse electromagnetic waves (with specific ratios between the magnetic field and the parameters of the plasma).

Increments are estimated for the types of instability investigated.

36. Stability of a Plasma in a Magnetic Field

"Stability of a Weakly Ionized Nonuniformly Heated Plasma in a Homogeneous Magnetic Field," by A. V. Timofeyev; Leningrad, Zhurnal Tekhnicheskoy Fiziki, Vol 32, No 11, Nov 62, pp 1297-1301

The stability of a weakly ionized plasma in a homogeneous external magnetic field without a longitudinal current is investigated. It is shown that such a plasma may become unstable if the density of its ionized components and the temperature of the electrons vary across the magnetic field and if their gradients are parallel.

37. Topography of the Magnetic Field, Induction Current, and Oscillations of Plasma

"Topography of the Magnetic Field, Induction Currents and Hydromagnetic Oscillations of a Plasma in a Pulse Electrodeless Discharge," by M. D. Gabovich and I. M. Mitropan, Institute of Physics, Academy of Sciences Ukrainian SSR; Leningrad, Zhurnal Tekhnicheskoy Fiziki, Vol 32, No 11, Nov 62, pp 1371-1375

The radial motion of a plasma coil in a pulse electrodeless discharge is investigated by moving belts and magnetic probes. Data are obtained on the time change of the topography of a magnetic field, including the lines of force locked in the plasma. The effect of an additional static magnetic field on the processes investigated is shown.

38. Magnetic Compression of an Electron Hole Plasma

"Optical Investigation of Magnetic Compression of an Electron Hole Plasma in InSb," by B. D. Osinov and A. N. Khvoshchev, Physics Institute imeni P. N. Lebedev, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 4, Oct 62, pp 1179-1183

The change of the transversal distribution of intensity of recombination luminescence of an electron hole plasma during a cascade breakdown in single crystals of indium antimonide under the action of a longitudinal magnetic field is investigated. Direct proof is obtained of the existence of magnetic compression (pinch effect) during a cascade breakdown. The temperature of the electron hole plasma is determined from the radiation spectrum. The concentration of non-equilibrium electron hole pairs is evaluated.

39. Volumetric Recombination in a Helium Plasma

"Investigation of Volumetric Recombination in a Helium Plasma in a Magnetic Field," by Yu. M. Aleskovskiy and V. L. Granovskiy, Moscow State University; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 4, Oct 62, pp 1253-1261

The deionization of a helium plasma in a homogeneous longitudinal magnetic field was investigated by probe and spectroscopic methods. By counting the number of electrons captured on various levels in He atoms, it is shown that when $H = 1$ kOe, $n_e = 2 \times 10^{11} \text{ cm}^{-3}$ and $p = 0.1$ mm mercury, the charged particles disappear mainly due to volumetric recombination in triple collisions: $\text{He} + 2e \rightarrow \text{He} + e$. The coefficient of recombination and its dependence on the electron temperature are determined.

40. Rates of Temperature Equalization in a Plasma

"Rates of Temperature Equalization of Charged Particles in a Plasma," by R. R. Ramazashvili, A. A. Rukhadze, and V. P. Silin, Physics Institute imeni P. N. Lebedev, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 4, Oct 62, pp 1323-1330

The relaxation of temperature both in a gas of charged particles of a single kind and between gases of particles of different kinds in a plasma, taking into account the interaction of particles with plasma waves, is examined. It is shown that the relaxation time of temperature in a strongly nonisothermal plasma may be considerably less than the relaxation time obtained without taking into account the interaction of particles with waves.

41. Polarizability of Plasmoids

"Effect of Internal Thermal Motion on the Polarizability of Plasmoids," by V. B. Gil'denburg, Radiophysics Institute, Gor'khov State University; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 4, Oct 62, pp 1394-1396

Resonance properties of restricted plasma entities determined by the oscillatory nature of the internal thermal motion of electrons are examined. The interaction of an alternating field with a plasma localized in a one-dimensional rectangular potential well is examined as a specific example.

42. Transformation and Scattering of Waves in a Plasma

"Theory of Transformation and Scattering of Waves on Fluctuations in a Plasma," by F. G. Bass and A. Ya. Blank, Institute of Radiophysics and Electronics, Academy of Sciences Ukrainian SSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 4, Oct 62, pp 1479-1488

A transformation of one type of normal waves into another type is possible during the scattering of waves on fluctuations in a plasma. The intensities of electromagnetic radiation and of the yield of longitudinal waves due to transformation in a nonisothermal plasma are found. The spectral correlation functions of various quantities characterizing the fluctuations are determined.

43. Energy Level Shifts and Equation of State for a Plasma

"Shifts of Energy Levels and the Equation of State of a Plasma," by L. P. Kudrin and Yu. A. Tarasov; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 4, Oct 62, pp 1504-1516

The level shifts of one electron atom in a plasma and of the equation of state of a Debye plasma are studied by using the two-particle Green's function. It is shown that low energy states experience a shift proportional to the root of the density and to the ratio kT/E_n when this ratio is small. The shift of the ground state of particles of charge $Z-1$ leads in thermodynamic functions to a correction exceeding the corrections obtained earlier in the Debye term if the densities of such particles are comparable with the electron density in the plasma.

Solid State Physics44. Prebreakdown Condition of Selenium Rectifiers

"Investigation of Prebreakdown Condition of Selenium Rectifiers at Various Temperatures," by I. M. Yashukova; Lenin-grad Politechnic Institute imeni M. I. Kalinin; Tomsk, Izvestiya Vysshikh Uchebnykh Zavedeniy, Fizika, No 5, 1962, pp 18-22

This article is on a study of the prebreakdown condition arising in selenium rectifiers at various temperatures. The pulse method of investigation was used to eliminate the thermal effect of the current. The method of measuring the reverse resistance of the rectifier consisted in determining with a pulse oscilloscope the voltage on the rectifier and the current pulse passing through the rectifier. Separate measurements of the resistance of the barrier.

45. In_2Se_3 Thin Layer Optical Properties

"Optical Properties of the In_2Se_3 Thin Layers," by V. P. Mushinskiy, Kishinev State University; Tomsk. Izvestiya Vysshikh Uchebnykh Zavedeniy, Fizika, No 5, 1962, pp 29-33

Recently compounds of the type $\text{A}^{\text{III}}\text{B}^{\text{VI}}$, due to their sensitivity to light radiation, drew the attention of investigators. As far as it is known, the optical properties of In_2Se_3 have not been studied much. In a previous work, the properties of the reflection of light by thin layers of In-Se compounds were studied. It was established that investigation of the reflection of light at small incident angles ($4-10^\circ$) makes it possible to isolate the compounds of the In-Se system -- In_2Se , InSe , and In_2Se_3 -- from all the gamma of the alloys of variable composition obtained by the method of S. A. Vekshinskiy.

In this article, the absorption spectrum is studied, and the dispersion of optical constants for In_2Se_3 thin layers is determined. Thin layers were chosen precisely because they are the shapes that are used most frequently as semiconductor materials to make photo resistors, bolometers, and other instruments to record radiation.

46. Oscillations of a Tunnel Current

"Oscillations of Tunnel Current in a Magnetic Field," by V. G. Bar'yakhtar and V. I. Makarov, Physicotechnical Institute, Academy of Sciences Ukrainian SSR; Moscow, Doklady Akademii Nauk SSSR, Vol 146, No 1, Sep 62, pp 63-64

The passage of an electric current in a magnetic field through two identical monocrystals separated by a sufficiently thin dielectric layer, the crystallographic axes of which are oriented in the same direction in the case when a constant difference of the potentials ω , is maintained between them, is examined. The external magnetic field H is applied perpendicularly to the boundary of the division.

47. Light Absorption in Cuprous Oxide Crystals

"Quadrupole Absorption of Light in a Cuprous Oxide Crystal. Multielectron Wave Functions of Frenkel Exciton," by N. V. Starostin; Leningrad, Vestnik Leningradskogo Universiteta, No 16, Seriya Fiziki i Khimii, Issue No 3, 1962, pp 40-46

Wave functions of a strong bond of the ground and excited states for a crystal of specific symmetry are constructed. Using these wave functions to compute the matrix element in optical transitions explains all the absorption characteristics connected with the crystal symmetry and makes it possible to compute the oscillator strength if the corresponding single electron functions are known.

48. Wave Functions of Gallium Ions

"Approximate Wave Functions of Gallium Ion in a Crystal," by Ye. V. Smirnova; Leningrad, Vestnik Leningradskogo Universiteta, No 16, Seriya Fiziki i Khimii, No 3, 1962, pp 66-71

Crystal phosphor KCl-Ga wherein gallium ions are taken as the activating impurity is investigated. Attention is given to the theoretical calculations of some properties of this phosphor.

49. Current Instability in Semiconductors

"Some Aspects of Current Instability in Semiconductors," by L. E. Gurevich and I. V. Ioffe, Physicotechnical Institute imeni A. F. Ioffe, Academy of Sciences USSR; Leningrad, Fizika Tverdogo Tela, Vol 4, No 10, Oct 62, pp 2964-2970

The investigation of current instability under various conditions is continued. It is shown that volumetric recombination impedes self-excitation and that self-excitation arises only in a bounded interval of angles between magnetic and electric fields. Self-excitation in a strong magnetic field is examined. The effect of the size of the model on the condition of self-excitation is investigated. It is shown that the Hall field and the illumination are mutually capable of extinguishing the arising oscillations. A semiconductor with an unequal concentration of carriers of both signs is examined.

50. Hall Current in Semiconductors

"Use of Hall Current To Investigate the Carrier Scattering in Semiconductors," by V. N. Dobrovolskiy and Yu. I. Gritsenko, Kiev State University imeni T. G. Shevchenko; Leningrad, Fizika Tverdogo Tela, Vol 4, No 10, Oct 62, pp 2760-2769

Calculation is made of the Hall current -- the current which arises in a sample at the time of deflection of the carriers by Lorentz forces. It is shown that the measurement of this current makes it possible to determine the Hall mobility. Methods for the experimental measurement of the Hall current are proposed. To determine the mobility based on the Hall current is more convenient in a number of cases than to determine it by the conventional method of measuring the Hall electromotive force, but in other cases it is possible to determine the mobility when the method of electromotive force is not applicable. The features of the method proposed are useful when investigating samples with a strongly developed surface layer having considerable conductivity, when measuring high-resistance materials, and when studying surface scattering.

The measurements of the Hall current were made on samples of copper oxide, and it was possible to establish the dependence of the mobility on the specific resistance, which cannot be done with the measurement of the Hall electromotive force.

51. Cyclotron Resonance in a Degenerate Band

"Quantum Theory of Cyclotron Resonance in a Degenerate Band," by G. A. Buramidze, G. Ye. Gurgenishvili, and G. R. Khutsishvili, Institute of Physics, Academy of Sciences Georgian SSR; Leningrad, Fizika Tverdogo Tela, Vol 4, No 10, Oct 62, pp 2958-2963

The probability of junctions between the Landau levels in the degenerate valent zone of germanium is calculated. At low temperatures, beside the transitions between the adjacent levels of one group, there may be transitions between the levels of various groups. The quantum longitudinal cyclotron resonance is examined.

52. Paramagnetic Resonance of Silver

"Paramagnetic Resonance in Free Atoms of Silver Captured in Nonpolar Media at 77°K," by R. A. Zhitnikov, N. V. Kolesnikov, and V. I. Kosyakov, Leningrad Physicotechnic Institute, Academy of Sciences USSR; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 4, Oct 62, pp 1186-1196

Free atoms of silver captured in various paraffins at liquid nitrogen temperature are obtained and investigated by the method of paramagnetic resonance. The spectra of the paramagnetic resonance in all the paraffin investigated proved practically the same and close to the spectrum of the free atoms of silver. Two different kinds of spectra which indicate two different types of places of capture of silver atoms in paraffins are shown for the atoms captured.

53. Electric Fields in Paramagnetic Resonance

"Role of Electric Fields in Paramagnetic Resonance," by A. B. Roytsin, Institute of Semiconductors, Academy of Sciences Ukrainian SSR; Leningrad, Fizika Tverdogo Tela, Vol 4, No 10, Oct 62, pp 2948-2957

A method is proposed to describe the effect of constant and variable electric fields on the paramagnetic resonance of local electron centers in crystals. The paramagnetic resonance on the ion V^{4+} and the atom Fe^0 embedded in a silicon crystal is examined.

54. Double Magnetic Resonance in Crystals

"Double Magnetic Resonance in Crystals," by B. N. Provotorov, Institute of Chemical Physics, Academy of Sciences USSR; Leningrad, Fizika Tverdogo Tela, Vol 4, No 10, Oct 62, pp 2940-2945

The change in dispersion and absorption signals under magnetic resonance saturation in the case of double magnetic resonance is determined theoretically. In this case, experimental data give the most obvious confirmation of spin-spin temperature under conditions of magnetic saturation.

55. Trapping of Minority Carriers

"Trapping of Minority Carriers on Silicon Surface," by V. Ye. Primachenko, Institute of Semiconductors, Academy of Sciences Ukrainian SSR; Leningrad, Fizika Tverdogo Tela, Vol 4, No 10, Oct 62, pp 2925-2930

Infraction of the bipolarity of proper photoconductivity in thin silicon plates processed in a standard etching agent is given. It is shown that this phenomenon is caused by the accumulation of a charge of minority carriers on fast silicon surface levels.

56. Plasma Compression in p-i-n Diode

"Plasma Compression in p-i-n Diode Under Action of Proper Magnetic Field," by G. V. Gordeyev, Physicotechnical Institute imeni A. F. Ioffe, Academy of Sciences USSR; Leningrad, Fizika Tverdogo Tela, Vol 4, No 10, Oct 62, pp 2890-2896

An explanation is given for the divergence from the Hall characteristic of the volt ampere characteristic of a p-i-n diode at large current densities as the result of plasma compression under the action of a proper magnetic field.

57. Effect of Betatron Bremsstrahlung and Neutrons on Electroconductivity

"Effect of 25-Mev Betatron Bremsstrahlung and 14-Mev Neutrons on Electroconductivity of Polymer Dielectrics," by A. P. Bazin; Leningrad, Fizika Tverdogo Tela, Vol 4, No 10, Oct 62, pp 2885-2889

Film samples of five polymer dielectrics used as electroinsulating material were irradiated in a vacuum condenser.

Specific volumetric resistance of the polymer dielectrics, investigated by inserting them into a beam of betatron bremsstrahlung (60 r/min at a distance of one meter), decreased rapidly by 2-3 orders, and after stopping the irradiation it returned to established value depending on the doseage received.

58. Local Levels in Semiconductors

"Fluctuation Local Levels in Amorphous Semiconductors," by A. I. Gubanov, Physicotechnical Institute imeni A. F. Ioffe, Academy of Sciences; Leningrad, Fizika Tverdogo Tela, Vol 4, No 10, Oct 62, pp 2873-2879

The emergence in amorphous bodies of local levels of electrons due to fluctuations in the arrangement of atoms is investigated theoretically. These fluctuation traps of electrons or holes could be the cause for the lack of impurity conductivity in glass-like semiconductors.

59. Surface Recombination Influence on Phase Shift

"Influence of Surface Recombination on Phase Shift Between Photoconductivity and Exciting Light," by Ye. D. Kopylovskiy and S. V. Bogdanov, Physical Institute imeni P. N. Lebedev, Academy of Sciences USSR; Leningrad, Fizika Tverdogo Tela, Vol 4, No 10, Oct 62, pp 2867-2872

The mechanism for the influence of surface recombination on the frequency dependence of the phase angle arising between the photoconductivity and the exciting light is explained. It is shown that the reason for this dependence is the "ripple" nature of the propagation of excessive carriers deep into the specimen and the change in their distribution according to thickness with a change in the frequency of light modulation.

60. Activation Energy and Structure Defects in Semiconductors

"Determination of Activation Energy of Impurity Center Levels and Structural Defects in Semiconductors," by N. A. Vitovskiy, T. V. Mashovets, and S. M. Ryvkin, Physicotechnical Institute imeni A. F. Ioffe, Academy of Sciences USSR; Leningrad, Fizika Tverdogo Tela, Vol 4, No 10, Oct 62, pp 2849-2853

The temperature dependences for the concentration of carriers in semiconductors which have impurities and defects, the spectrum of which contains several same types of levels, are complex and consist of a number of alternate oblique and horizontal sections.

The problem of quantitative interpretation of such dependences with the goal of determining the activation levels from their energies is analyzed in this article.

61. Gamma Radiation Defect in Silicon

"Energy Spectrum of Gamma Radiation Defect in Silicon," by N. A. Vitovskiy, T. V. Mashovets, and S. M. Ryvkin, Physicotechnical Institute imeni A. F. Ioffe, Academy of Sciences USSR; Leningrad, Fizika Tverdogo Tela, Vol 4, No 10 Oct 62, pp 2845-2848

The temperature dependence of the Hall coefficient in n- and p-type silicon specimens is investigated before and after irradiation by gamma rays Co^{60} .

Two levels of radiation defects in the upper half of the forbidden zone and one in the lower half are detected. The activation energies and the cross section of formation of these levels are determined.

62. Energy of Impurity Atom Paired Interaction

"Determination of Elastic Energy of Impurity Atom Paired Interaction in a Crystal Lattice," by A. G. Khachaturyan, Institute of the Physics of Metals and Metal Working; Leningrad, Fizika Tverdogo Tela, Vol 4, No 10, Oct 62, pp 2840-2845

The calculation of a Fourier type energy of elastic interaction of two-point defects is derived within the frame work of atomistic approximation.

As an example of the application of the calculation, the problem diffusion scattering of X rays by a face-centered interstitial solution is examined. Concrete expressions, suitable for practical application, whose parameters are known from independent experiment are obtained.

63. Electrodynamics of Superconductors

"Electrodynamics of Superconductors," by V. Z. Kresin, Moscow State Correspondence Pedagogical Institute; Leningrad, Fizika Tverdogo Tela, Vol 4, No 10, Oct 62, pp 2832-2834

A method to obtain an expression invariant with respect to the gradient density of a superconducting current is proposed.

64. Excess Current Carrier Conductivity in Magnetic Fields

"Investigation of Conductivity Caused by Excess Current Carriers in a Magnetic Field," by V. N. Dobrovolskiy, Kiev State University; Leningrad, Fizika Tverdogo Tela, Vol 4, No 10, Oct 62, pp 2806-2812

Investigation of the conductivity caused by excess current carriers in a transverse magnetic field is given.

The negative excess conductivity is determined with magnetic fields greater than 4,500 or at -183°C.

65. Photosensitivity and Luminescence of CdS Single Crystals

"Long-Wave Photosensitivity and Infared Luminescence of CdS Single Crystals," by V. V. Serdyuk Odessa State University imeni I. I. Mechnikov; Leningrad, Fizika Tverdogo Tela, Vol 4, No 10, Oct 62, pp 2802-2805

Long-wave activation of CdS crystals by a thermal treatment is accompanied by the appearance of infrared luminescence. Some features of the photoconductivity and the infrared luminescence of CdS crystals after thermal treatment are investigated; the similarity of their excitation spectra is shown.

66. Law of Dispersion in Phonons

"Properties of the Law of Dispersion in Phonons Connected With the Electron Phonon Interaction," by A. M. Afanas'yev and Yu. Kagan; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 4, Oct 62, pp 1456-1463

Peculiarities in the law of dispersion of phonons due to electron phonon interaction are analyzed by the use of the method of Green's functions. It is shown that the nature of the properties is significantly connected with the form of Fermi surface. If one of the radi

of curvature is great (for example, Fermi surfaces close to cylindrical), then in place of logarithmic properties in the derivative of the frequency with respect to the wave vector, a root property appears. If both radii of curvature are great (Fermi surfaces close to flat), a property of the form $1/x$ appears. In this case there will also be a substantial absolute rearrangement of the spectrum.

Mechanics

67. Relativistic Mechanics of Material Point of Variable Mass

"The Relativistic Mechanics of a Material Point of Variable Mass" (presented by Academician Yu. O. Mitropol'skiy, Academy of Sciences Ukrainian SSR, by V. M. Shevelo and V. G. Shtelik, Institutes of Mathematics and Cybernetics, Academy of Sciences; Ukrainian SSR; Kiev, Doklady Akademii Nauk Ukrainskoy SSR, No 10, 1962, pp 1313-1316

The authors investigate the one-dimensional case of the equation

$$\frac{d}{dt} \frac{m(t)\vec{v}}{(1 - v^2/c^2)^{1/2}} - \frac{\vec{u}}{(1 - u^2/c^2)^{1/2}} \frac{dm(t)}{dt} = \vec{F},$$

where $m(t)$ is mass at rest, v is the absolute velocity of the mass m , \vec{u} is the absolute velocity of the mass being separated, and c is the speed of light in a vacuum.

This equation is a relativistic generalization of I. V. Meshcherskiy's basic equation for a material point of variable mass, and here it is studied from the standpoint of oscillation, stability, and the behavior of the oscillation amplitude. A relativistic pendulum is considered as an example.

68. Additional Possible Characteristics of an Unstable Particle

"Possible Determination of Additional Characteristics of an Unstable Particle," by A. M. Perelomov; Moscow, Doklady Akademii Nauk SSSR, Vol 146, No 1, Sep 62, pp 75-78

Besides the characteristics which are usually examined (the mass of an unstable particle and its lifetime) attention is given to the possibility of "determining" still other characteristics of an unstable particle, for example its magnetic dipole moment and the electric moment.

69. Rise of Intensity of Radiation Before Emergence of Shock Wave

"The Rise in the Intensity of Radiation Before the Emergence of a Shock Wave on the Surface of a Homogeneous Medium," by I. A. Klimishin and A. L. Kravchuk; Kiev, Ukrains'kyi Fizichnyy Zhurnal, Vol 7, No 10, Oct 62, pp 1083-1089

Expressions are obtained to determine the rise of the intensity of radiation before the emergence of a shock wave, which is moving in a homogeneous medium, on its surface. The theory of transient scattering of light, developed by V. V. Sobolev was applied. The time of rise in brightness due to raying is very short for dense media ($n > 10^{12}$) and increases sharply with a decrease in density.

70. Cross Approximation in Hypersonic Aerodynamics

"A Method of Cross Approximation in Hypersonic Aerodynamics," by I. I. Alekseenko, R. G. Barantsev, and I. N. Panteleyeva; Leningrad, Vestnik Leningradskogo Universiteta, No 19, Seriya Matematiki, Mekhaniki i Astronomii, Issue 4, 1962, pp 62-78

The direct problem of hypersonic flow about blunt-nose bodies is solved by the method of a priori Ansatz of stream function dependence upon the transversal coordinate counted along the normal to the shock wave. The case of the linear approximation is considered in detail.

71. Solution of Laminar Boundary Layer Equations

"A Method of Successive Approximations for Calculation of the Laminar Boundary Layer on Axially Symmetric Bodies," by L. A. Kulonen; Leningrad, Vestnik Leningradskogo Universiteta No 19, Seriya Matematiki, Mekhaniki, i Astronomii, Issue 4, 1962, pp 86-95

A method of successive approximations solving the laminar boundary layer equation in binary mixture of gases on the bodies of revolution taking account of chemical reactions and diffusion is proposed. The conception of asymptotic boundary layer and Crocco's variables are used. The method is illustrated by an example of calculation of the laminar boundary layer on a flat plate without pressure gradient.

72. Polytropic Exponents of Detonation Products

"Experimental Determination of the Polytropic Exponent of Detonation Products for Some Liquid Explosive Substances," by V. A. Odintsov, V. S. Solov'yev, and I. D. Fedotov, Moscow Higher Technical School imeni N.E. Bauman; Tomsk, Izvestiya Vysshikh Uchebnykh Zavedeniy, Fizika, No 5, 1962, pp 86-88

An experimental method is proposed to determine the exponent k in the compressibility law of the detonation products $pv^k = \text{const}$ which is based on the measurement of the angle of scattering of the detonation products.

Advantages of the method compared to existing ones are the possibility of measuring the angles for small distances from the charge and also the simplicity of the experiment.

Values of the exponent k for a number of liquid substances are obtained.

73. Quantum Electrodynamics

"Quantum Electrodynamics in Terms of Terminal Field Strength," by V. I. Ogiyevetskiy and I. V. Polubarinov, Joint Institute for Nuclear Research; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 4, Oct 62, pp 1365-1370

A Lorentz invariant formulation is found for quantum electrodynamics in which the potentials do not enter but only the electromagnetic strength.

74. Three Dimensional Spinors in Quantum Mechanics

"Three Dimensional Spinors in Quantum Mechanics," by A. P. Gel'man, Moscow Institute of Chemical Technology imeni Mendeleyev; Tomsk, Izvestiya Vysshikh Uchebnykh Zavedeniy, No 5, 1962, pp 128-132

It is shown that a rigorous calculation of the spinor nature of the electron wave function reduces in a nonrelativistic approximation to results which are usually considered essentially relativistic (negative value of orbital moment, relation between the magnetic and the spin moments).

75. New Method To Investigate Linear Systems

"Possible New Method of Investigating the Statistical Behavior of Linear Systems," by M. I. Podgoretskiy, Joint Institute for Nuclear Research; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 4, Oct 62, pp 1349-1357

A new approach to the investigation of the statistical behavior of linear systems is described. For a comparison with the method of kinetic equation and with so-called "direct summation" several problems which were not solved by these two methods are examined.

76. Rotational Motion of Molecules of a Liquid

"Investigation of the Rotational Motion of Molecules of a Liquid by the Method of Nuclear Magnetic Resonance," by A. Sh. Agishev, Kazan Pedagogical Institute; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 4, Oct 62, pp 1154-1157

Measurements and calculations are made of the characteristic turning times of molecules of benzene, naphthalene and anthracene dissolved in CCl₄. The results of the calculation are compared with experiment. In addition, taking into account the form of the molecules improves somewhat the agreement of theory with experiment.

77. Nuclear Magnetic Resonance in Aqueous Solutions

"Nuclear Magnetic Resonance in Concentrated Aqueous Solution of VO₂," by N. S. Kucheryavenko, Kazan State Pedagogical Institute; Moscow, Zhurnal Eksperimental'noy i Teoreticheskoy Fiziki, Vol 43, No 4, Oct 62, pp 1164-1174

The spin echo method is used to investigate high concentration aqueous solutions of VOCl₂ and VOSO₄. The dependence upon the concentration of the relaxation time T¹ and T² agrees with existing theory when taking into account the exchange interaction.

78. Relation of Speed of Sound to Parameters of a Liquid

"Relation of the Speed of Sound to the Physical Parameters of a Liquid," by N. F. Otpushchennikov, Kursk Pedagogical Institute; Tomsk, Izvestiya Vysshikh Uchebnykh Zavedeniy, Fizika, No 5, 1962, pp 133-139

It is shown how it is possible to determine the definite relation between the speed of sound and such simple physical parameters of a liquid as the thermal capacity, the coefficient of volumetric extension, the molecular weight, the relation $C_p = C_v$, and the

temperature. The following were used in solving this problem: (1) the existing relation between the speed of sound and the potential energy of the liquid; (2) the Lennard-Jones potential function, and (3) the first law of thermodynamics. A check is made of the formulas obtained theoretically for the speed of the propagation of sound in liquids with experimental data. There is good agreement between theory and experiment.

79. Kinetic Theory of Overcondensation

"Kinetic Theory of Overcondensation with Small Differences of Temperature," by R. Ya. Kucherov, L. E. Rikenglaz, and T. S. Tsulaya; Leningrad, Zhurnal Tekhnicheskoy Fiziki, Vol 32, No 11, Nov 62, pp 1392-1398

Overcondensation with a small temperature difference is investigated for large and small Knudsen numbers.

80. Stresses Around Curvilinear Holes in Shells

"An Approximate Method for Determining the Concentration of Stresses Around Curvilinear Holes in Shells," by A. N. Guz'; Kiev, Prykladna Mekhanika, Vol 8, No 6, 1962, pp 605-612

A method is considered for constructing approximate solutions for problems on stress concentration around curvilinear holes in shells when the solution of the basic equation of the theory of shallow shells is presented in the form of Fourier's series in polar coordinates.

The equations and boundary condition applied are the same as in the paper ["Pro Kontsentratsiyu Napruzhen' Navkolo Otvoriv v Tonkykh Pruzhnykh Obolonkakh" (On Concentration of Stresses Around Holes in Thin Elastic Shells), by G. N. Savin; Kiev, Prykladna Mekhanika, Vol 7, No 1, 1961].

Further, the method of "perturbation of the boundary" is applied. This method permits solving the problem for elliptical, quadratic and triangular holes on satisfying the boundary conditions on 2 circumference selected by a definite method. A numerical example is presented for a plate, showing fairly rapid convergence.

31. Determination of Rod Deformations

"Propagation of Load Waves in an Elastic Viscous Plastic Rod," by S. A. Leonov; Kiev, Prykladna Mekhanika, Vol 8, No 6, 1962, pp 645-652

The author considers the problem of the propagation of plane elastic viscous plastic waves in a semi-infinite rod, the "equation of state" of which depends on the time and is expressed by

Under a constant rate of loading, the problem of finding the displacements and the deformations is reduced to a partial linear differential equation of the third order.

General solutions for the determination of the magnitudes of the deformations and displacements by Laplace's method were obtained in the form of converging series. On considering the behavior of the end section of the rod ($x = 0$), the difference between reinforced and unreinforced material can be seen. Thus with $t \rightarrow \infty$ the deformation tends towards a definite limit, with $t = 0$ it tends to become infinite.

An expression is presented for the stress jump on the deloading wave.

32. Theory of Rod Bending

"Theory of the Bending of Rods in Time Allowing for Plastic Deformations in the Compression Zone," by V. F. Yatsenko; Kiev, Prykladna Mekhanika, Vol 8, No 6, 1962, pp 658-664

The author considers the change in time of normal stress during bending under a constant load of rods made of elastic viscous plastic material for the case when the plastic deformations develop only in the compression zone of the section.

The basic equations are obtained for the determination of the dimensions of the elastic and plastic cores and of the stresses within them. A differential equation is obtained for a curved axis and methods are given for integrating it, which permit allowing for the effect of the development in time of viscous and plastic deformations on the magnitude of the sag and angles of turn of the sections during bending.

83. Waves Caused by Periodic Pressures

"Development of Waves on the Surface of a Flow Under the Influence of Periodic Pressures" (presented by Academician V. I. Krylov, Belorussian SSR Academy of Sciences), by L. V. Cherkesov, Institute of Mathematics and Computer Engineering, Academy of Sciences Belorussian SSR; Minsk, Doklady Akademii Nauk BSSR, Vol 6, No 10, Oct 62, pp 623-625

D. D. Stoker (Volny na Vode [Waves on Water], IL, Moscow, 1959) has studied the problem of rough waves caused by pressure, constant with time, applied to the surface of a flow. This paper concerns a similar problem for the case in which the application of the pressure is a periodic function of time. Two situations are considered: (1) a horizontal surface of an undisturbed liquid flowing in a channel of infinite depth and subjected to a periodic pressure of the form $p = p_0 \sin \omega t$; (2) damping of waves on the surface of a flow under the influence of the pressure represented by the given equation by discontinuing the pressure.

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Magnetism

84. Measurement of Magnetic Susceptibility

"A Method of Measuring Magnetic Susceptibility," by N. P. Gavaleshko; Kiev, Ukrains'kyy Fizichnyy Zhurnal, Vol 7, No 10, Oct 62, pp 1068-1078

A method is presented for measuring magnetic susceptibility of semiconductors and other weakly magnetic substances by a modification of Gui's method. One of the advantages of the described method is that a number of measurements may be carried out on one same sample, such as magnetic susceptibility, electrical conductivity, the Hall effect, thermal emf, etc. The use of a special form of pole tips in the electromagnet of the setup, as well as the use of high saturating

magnetic fields, makes it possible to exclude the effect of ferromagnetic impurities (when they are present in the investigated substances). A detailed description is given of the system of automatic compensation of the force acting on the sample in a heterogeneous magnetic field. The setup permits measuring the temperature dependence of the magnetic susceptibility over a temperature range of 77-1,000°K, the results being recorded on a diagram by means of an EPP-09 self-recording potentiometer. The sensitivity of the setup is on the order of 10^{-11} CGSM units per gram; the precision of the absolute measurement is on the order of 1%. The article concludes with data obtained on measuring the magnetic susceptibility on a number of metals and semiconductors (HgTe, HgSe CdTe, etc.).

Optics and Spectroscopy

85. Width of Spectral Lines

"Temperature Dependence of the Bandwidth of Infrared Absorption Spectra," by A. V. Rakov, Leningrad, Optika i Spektroskopiya, Vol 13, No 3, Sep 62, pp 369-373

The temperature dependence of the bandwidths of infrared absorption spectra of cyclohexane ($\nu = 903/\text{cm}$), toluene ($\nu = 892$ and $1086/\text{cm}$) and acetonitrile ($\nu = 918/\text{cm}$) is investigated. It is shown that the changes in the bandwidth due to changes in the temperature of the substance are basically due to Brownian irregular movement of molecules. The potential barriers of the reorientation of the molecules for the investigated substances are determined.

86. Calculation of Single Reflecting Surface Lens

"Calculation of a Simple Lens With Single Reflecting Surface," by D. V. Gavrilov; Leningrad, Optika i Spektroskopiya, Vol 13, No 3, Sep 62, pp 436-441

Application of the method of separation of variables proposed by G. G. Slyusarev to establish the relation between the basic parameters P , W , H , C of 2 lens with one reflecting surface and its internal elements (radii of the curvature r_k of its surface and index of refraction n_p of the glass from which the lens is prepared) is given. Use is also made of the relations obtained for calculation of 2 lens with one reflecting surface according to given aberrations of the 3rd order.

87. Correction of X-Ray Spectra

"Correction of X-Ray Spectra for Symmetric Distortion,"
 by V. P. Sachenko and I. Ya. Nikiforov; Leningrad,
Optika i Spektroskopiya, Vol 13, No 3, Sep 62,
 pp 447-450

A method of correction of X-ray spectra for a symmetric distortion, which can also be useful in case of a nonsymmetric distortion, is proposed. This method is considerably easier than those used earlier. A method, proposed earlier by one of the authors, for finding the best approximation for a case of arbitrary form is generalized.

88. Computation of Lithium Atom and Calculation of Magnetic Moment of Nucleus

"Computation of the Lithium Atom in the Adiabatic Approximation and Calculation of the Magnetic Moment of the Nucleus," by M. G. Veselov and I. B. Bersuker; Leningrad Optika i Spektroskopiya, Vol 13, No 3, Sep 62, pp 297-301

The results are given on the calculation of the lithium atom in the adiabatic approximation in which the effect of the polarization of the core by optical electron and the reverse influence of this polarization on the optical electron are automatically taken into account. Here the wave function of the internal 1s-electron becomes deformed and dependent on the position of the optical electron as well as the parameter, and the potential of the "mirror forces" enters, naturally, into the equation for the optical electron. The latter was integrated for states 2s, 2p, and 3p. A noticeable improvement in the shape of the wave function close to zero is one of the advantages of this method. This made it possible to calculate the magnetic moment of the Li⁷ nucleus in close conformity to experimental data.

89. Broadening of Ne II and Kr II Spectral Lines

"On Broadening of Spectral Lines in a Strongly Ionized Plasma. II. Broadening of Ion Lines of Inert Gases," by M. A. Mazing and N. A. Vrublevskaya; Leningrad, Optika i Spektroskopiya, Vol 13, No 3, Sep 62, pp 308-312

An experimental investigation was made of the broadening of NeII and Kr II lines in a spark discharge. The results agree with those obtained earlier on Ar II and He I lines. Comparison with the transient theory of broadening of lines shows that the theory satisfactorily describes the broadening of lines with large and medium values of constants of the quadratic Stark effect. The broadening of the lines with small Stark constants on the order of 10^{-15} cm⁴/sec is not within the framework of the theory. A comparison with the results of Ar II lines leads to conclusion that the shift of lines is described correctly but the quantitative calculation of the width of such lines requires additional assumptions.

90. Determination of Integral Intensity and Halfwidth Lines

"Approximate Method of Determination of the Integral Intensity and Halfwidth of Lines in Rotating-Vibrational Absorption Bands of Gases," by P. I. Bresler; Leningrad, Optika i Spektroskopiya, Vol 13, No 3, Sep 62, pp 313-316

The selective optical-acoustical radiation receiver is used for approximate determination of integral intensity and halfwidth lines of infrared bands of gases.

II. MATHEMATICS

91. Locally Nilpotent Subgroups of Periodic Linear Groups

"Locally Nilpotent Subgroups of Periodic Linear Groups"
 (presented by Academician V. I. Krylov, Belorussian SSR
 Academy of Sciences), by M. S. Garashchuk, Belorussian State
 University imeni V. I. Lenin; Minsk, Doklady Akademii Nauk BSSR,
 Vol 6, No 9, Sep 62, pp 545-547

The article concerns maximum irreducible locally nilpotent subgroups of an arbitrary periodic linear group over an algebraically closed field of zero characteristic. It is shown that maximum irreducible locally nilpotent subgroups of every periodic group are conjugate in it. One result of a lattice of maximum locally nilpotent π -subgroups of a group $GL(n, P)$ is presented, where π is a given set of prime numbers contained in an article by D. A. Suprunenko (Matematicheskiy Sbornik, Vol 55, 13-6, 1961).

92. Finitely Approximable Abelian Groups With Multiple Operators

"Finitely Approximable Abelian Groups With Multiple Operators,"
 by D. M. Smirnov and M. A. Taytslin; Moscow, Uspekhi Matematicheskikh Nauk, Vol 17, No 5, Sep/Oct 62, pp 137-142

The additive group A on which is defined some set Ω of operations whose zero element expresses a subalgebra, i.e., $w(0, 0, \dots, 0) = 0$ for all $w \in \Omega$, is called an Ω -group. This Ω -group is expressed in the form $\mu = (A, \Omega)$, where $A = A(\mu)$ is an additive group of an Ω -group of μ .

An important problem in the general theory of algebra is finding a class of finitely approximable algebras. Such a problem for Abelian Ω -groups. The authors study this problem for Abelian Ω -groups with natural limitations. It is assumed that the condition of a finite number of Ω -generatrices in an Abelian Ω -group of μ (and even in all Ω -subgroups of μ) is insufficient for the finite approximability of μ . Several classes of Abelian Ω -groups are isolated and their relations to each are indicated.

Submitted 14 July 1960.

93. Theory of Numbers

"Transcendental Numbers Having a Given Type of Approximation,"
by N. I. Fel'dman; Moscow, Uspekhi Matematicheskikh Nauk, Vol 17,
No 5, Sep/Oct 62, pp 145-151

K. Mahler ("An Approximation of Exponential Functions and Logarithms," Journ. Rein. u. Angew. Math., 166, 1932, p 118) based his study of transcendental numbers on the behavior of the function

$$\omega_N(H, \alpha) = \min_{|a_i| \leq H} |a_0 \alpha^0 + a_1 \alpha^{-1} + \dots + a_N \alpha^{-N}|,$$

where the integers a_i ($i = 0, 1, \dots, n$) are not all equal to zero. Th. Schneider showed (Einführung in die Transzendenten Zahlen [Introduction to Transcendental Numbers], Gottingen, 1957) that for nearly all transcendental numbers the relation

$$\varphi(H, n, \alpha) = \frac{-\ln \omega_N(H, \alpha)}{\ln H} \leq (2 + \varepsilon)n, \quad \varepsilon > 0, \quad H \geq H_0(\varepsilon)$$

holds.

In this paper the author proves the existence of numbers α for which the function $\varphi(H, n, \alpha)$ for $n > n$ remains unbounded (i.e., α does not appear in any of the Leveque classes U^1, U^2, \dots, U_N) and at the same time, for every v_i ($i = 1, \dots, s, 2 \geq s \geq n$), $v_i \geq n$, for as large an H as one pleases, satisfies the inequalities $\varphi(H, v_i, \alpha) > w_i$ ($i = 1, \dots, s$), where w_1, \dots, w_s are many numbers as large as one pleases.

Submitted 30 January 1960.

94. Dirichlet Series Bounded on Real Axis

"The Form of Dirichlet Series Bounded on the Real Axis,"
by M. A. Yevgrafov; Moscow, Uspekhi Matematicheskikh Nauk,
Vol 17, No 5, Sep/Oct 62, pp 123-127

Given the Dirichlet series $F(x) = \sum_{n=1}^{\infty} a_n e^{\lambda_n x}$, convergent for all finite x and satisfying the conditions

$$\prod_{n=1}^{\infty} \left(1 - \frac{z_n}{\lambda_n}\right), \quad 0 < \lambda_1 < \lambda_2 < \dots, \lambda \sim n, |\psi(\lambda_n)|/n \sim 1, \text{ where } \psi(z) =$$

Two theorems are proven which make it possible to reduce many problems concerning Dirichlet series bounded on the real axis to problems concerning the behavior of functions that are regular in the right half plane.

Submitted 22 July 1960.

95. Continual Integrals

"Continual Integrals Connected With Operator Equations of Evolution," by Yu. L. Daletskiy; Moscow, Uspekhi Matematicheskikh Nauk, Vol 17, No 5, Sep/Oct 62, pp 3-115

The paper is a study of an abstract equation of Schrödinger of the form $\frac{d\Psi}{dt} = iH\Psi$, where H is a self-conjugate operator with two "paths." There are eight parts, titled as follows: (1) a discrete event, (2) quasi measures and continual integrals, (3) basic and generalized elements of a Hilbert space, (4) equations of evolution, (5) abstract hyperbolic equations, (6) fundamental solutions of equations of evolution, (7) continual integrals connected with abstract hyperbolic equations, and (8) generalized kernels in the form of weak continual integrals.

First of all, the equation $\frac{d\Psi}{dt} = H(t)\Psi$ is studied, with the operator H not dependent on time, after which a modification, made necessary by complications arising in the general case, is considered.

A knowledge of the theory of operators in Hilbert space - in particular, the spectral theory of self-conjugate operators, based on the concept of the theory of generalized functions and the theory of measures - and of the basic facts of the theory of Markov random processes, is assumed.

96. Extension of Continuously Differentiable Functions

"Extension of Continuously Differentiable Functions," by V. V. Vasil'kovskiy and A. D. Myshkis; Moscow, Uspekhi Matematicheskikh Nauk, Vol 17, No 5, Sep/Oct 62, pp 117-122

The article concerns the following problem on the extension of differentiable functions:

"Assume in n -dimensional ($n \leq 2$) Euclidean space E_N of points $x = (x_1, \dots, x_N)$ a given region G , which for simplification we will consider bounded; assume also a certain natural number k . It is required to find: for what conditions any function $f(x)$, given in G and uniformly continuous, together with all of its derivatives to the k^{th} order inclusive, can be extended in all of E_N to the function $f^*(x)$ (i.e., $f^*(x) \equiv f(x)$ in G), k times continuously differentiable."

Submitted 30 September 1960.

97. Linearization for Distribution Functions in Nonlinear Oscillation

"Linearization for Distribution Functions in Problems in the Theory of Nonlinear Oscillation," by M. Z. Kolovskiy and A. A. Pervozvanskiy; Moscow, Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk: Mekhanika i Mashinostroyeniye, No 5, Sep/Oct 62, pp 118-128

The authors discuss a method of approximating polyharmonic solutions of nonlinear equations of the form

$Q(p)y + R(p)x = S(p)z$, $y = f(x)$ ($p \leq d$), where $Q(p)$, $R(p)$, and $S(p)$ are polynomials of the operator p ; the function $f(x)$ is nonlinear; and z is a given function of time (harmonic or polyharmonic).

For purposes of simplification the nonlinear function $f(x)$ is considered to be odd, and the solution can be expressed in the form $x = a \sin t$. The problem then reduces to one of finding the coefficient q of the linear approximation $f(x) \approx qx$.

98. Elliptical Systems in Multidimensional Regions

"General Boundary Value Problems for Elliptic Systems in Multidimensional Regions" (presented by Academician I. G. Petrovskiy 16 Apr 62), by M. S. Agranovich and I. S. Dynin, All-Union Machine Building Correspondence Institute, Petrozavodsk State University; Moscow, Doklady Akademii Nauk SSSR, Vol 146, No 3, 21 Sep 62, pp 511-514

The bounded region G in Euclidean space R^N of points $x = (x^1, \dots, x^N)$ is given. Its boundary Γ is assumed to be an $(n-1)$ -dimensional infinitely smooth surface, allowing a local "straightening" by means of a transformation of coordinates. The operator $\Delta u / \Delta(x, D)u(x)$ in the region G is considered, where $u(x)$ is a column of p functions; $\Delta(x, D)$ is a square matrix of order p , consisting of linear operators in partial derivatives of order s with infinitely smooth complex coefficients in \bar{G} ; and $D = (D_1, \dots, D_p)$, where $D_j = -i\partial / \partial x^j$.

The results are analogous to those obtained by I. S. Dynin for the case of one elliptic equation (DAN, 141, No 2, 1961).

99. Expansion of Non-Self-Conjugate Systems of Differential Equations in Eigenfunctions

"Expansion of a Non-Self-Conjugate System of Differential Equations in Eigenfunctions Along the Entire Axis" (presented 17 Apr 62 by Academician I. G. Petrovskiy), by M. Gimadishlamov; Moscow, Doklady Akademii Nauk SSSR, Vol 146, No 3, 21 Sep 62, pp 519-522

The article concerns the expansion in eigenfunctions for a non-self-conjugate operator generated by a system of second-order differential equations, along the entire axis. The system of differential equations can be expressed simply, in the form

$$\ell(y) = -y'' + P(x)y,$$

where $y(x)$ is a k -dimensional vector-column, $P(x)$ is a k^{th} order complex-valued matrix.

100. Numerical Solution of Difference Equations

"A Method of Orthogonal Iteration for the Solution of Systems of Difference Equations," by S. K. Godunov; Moscow, Zhurnal Vychislitel'-noy Matematiki i Matematicheskoy Fiziki, Vol 2, No 6, Nov/Dec 62, pp 972-982

The paper describes a method for the numerical solution of systems of linear equations of the form

$Lu_0 = \varphi$, $Ru_N = \psi$, $\wedge u_{N-1} + B_{N-1}u_N = f_{N-1}$ ($n = 1, 2, \dots, N$). Here u_i , f_j are p -dimensional vectors; L and R are matrices, not necessarily square; A_{N-1} , B_{N-1} are square matrices; and $N \geq p$ is the number of steps of a finite-difference approximation, such that $N \rightarrow \infty$ for $h \rightarrow 0$.

The method is a variation of a widely used iteration method in which the matrix inversion is replaced by orthogonality. The error in the method is shown.

101. Stability of Linear Difference Equations

"Stability of Linear Difference Equations," by I. V. Konoval'-tsev; Moscow, Zhurnal Vychislitel'noy Matematiki i Matematicheskoy Fiziki, Vol 2, No 6, Nov/Dec 62, pp 983-996

In this paper the author studies the problem of stability of linear difference equations with variable coefficients of the type

$$u_{n+k} = a_1(n)u_{n+k-1} + \dots + a_k(n)u_n, \\ u_1 = u_1, \dots, u_k = u_k \quad (n=1, 2, \dots).$$

Equations of this type, as approximations of ordinary differential equations, are studied, and the sufficient conditions for their stability are found.

102. Application of Method of Alternating Upper and Lower Approximations to Systems of Ordinary Nonlinear Differential Equations

"Application of the Method of Alternating Upper and Lower Approximations to Systems of Ordinary Nonlinear Differential Equations" (presented by Academician Yu. O. Mitropol'skiy, Academy of Sciences Ukrainian SSR Sciences), by V. D. Getmantsev, Kiev Institute of National Economy; Kiev, Doklady Akademii Nauk Ukrainskoy SSR, No 10, 1962, pp 1286-1289

The author considers the question of the construction of upper and lower limits of approximations for solutions of systems of ordinary nonlinear differential equations with initial conditions. The right sides of the system of equations satisfy the conditions of Cauchy's theorem on the existence and uniqueness of the solution, no other limitations being imposed. A recurrent formula is derived for the determination of the $(n+1)$ th approximation by the n -th, and it is shown that if the initial approximation is an upper or lower limit of the sought solution, all subsequent ones will be alternately lower or upper.

103. Eigenvalues and Discrete Values of the Sum and Product of Linear Operators

"Eigenvalues and Discrete Values of the Sum and Product of Linear Operators" (presented 5 Apr 62 by Academician P. S. Aleksandrov), by A. S. Markus, Institute of Physics and Mathematics, Academy of Sciences, Moldavian SSR; Moscow, Doklady Akademii Nauk SSSR, Vol 146, No 1, 1 Sep 62, pp 34-36

V. B. Lidskiy (DAN, 75, No 6, p 769, 1950) proved a theorem establishing in geometrical form the relation between eigenvalues of the sum of Hermitian matrices and eigenvalues of the terms; he also solved a similar problem for the product of positively defined matrices.

In this article the author establishes some properties about discrete values of matrices similar to Lidskiy's theorem and also generalizes Lidskiy's theorem and certain propositions for infinite-dimensional cases. The results, including a new proof of Lidskiy's theorem on eigenvalues of the sum of Hermitian matrices, are based on a theorem of M. G. Kreyn and D. P. Mil'man (Studia Math., 9, p 133, 1940) on boundary points of a convex bicompact set and also on ideals in the work of Wielandt (Proc. AM. Math. Soc., 6, No 1, p 106, 1955).

104. Bessel Operators

"Operator Calculus of Bessel Operators," by V. A. Ditkin and A.P. Prudnikov; Moscow, Zhurnal Vychislitel'noy Matematiki i Matematicheskoy Fiziki, Vol 2, No 6, Nov/Dec 62, pp 997-1018

The article concerns Bessel operators of the type

$$E_k = \frac{1}{t} (t - \frac{d}{dt})^k, \quad k = 2, 3, \dots, n.$$

Two general classes of this type of operator are presented: $E_N = \frac{1}{t} (t - \frac{d}{dt})^N$ and $T = \frac{d}{dt} t \frac{d}{dt} t \frac{d}{dt}$, including tables of formulas in which each operator is used.

105. Continuation of Solutions of Partial Differential Equations

"Continuation of Solutions of Partial Differential Equations" (presented 2 Apr 62 by Academician I. G. Petrovskiy), by B. M. Levitan; Moscow, Doklady Akademii Nauk SSSR, Vol 146, No 1, 1 Sep 62, pp 30-33

It is given that D is a closed region of n -dimensional space and σ is part of the boundary of the region D , u is a solution of the linear differential equation $L(u) = 0$ in the region D . It is assumed that the

coefficients of the operator L are also given in some neighborhood of α . The question is asked, whether a continuation of the function u is possible in this neighborhood, such that the equation $L(u) = 0$ is satisfied.

H. Lewy (Bull. AM. Math. Soc., 65, 37, 1959) proved that for a solution of an elliptic equation with two independent variables and analytic coefficients which satisfies an analytic boundary value condition in the interval bounded by the line $y = 0$ a continuation is possible through that interval.

In this article the author applies the technique of "transformation operators" to the problem of continuation of solutions in several cases involving partial differential equations.

106. Asymptotic Formulas for Solutions of Linear Systems of Ordinary Differential Equations

"Asymptotic Formulas for Solutions of Linear Systems of Ordinary Differential Equations" (Presented by Academician I. Z. Shtokalo Academy of Sciences), Ukrainian SSR, by O. V. Kostin, Odessa State University; Doklady Akademii Nauk Ukrainskoy SSR, Kiev, No 10, 1962, pp 1293-1296

Systems of the type $\frac{dy_i}{dt} = \sum_{k=1}^n p_{ik}(t)y_k \quad (i = 1, \dots, n)$ are investigated in this paper. Here, $t \geq T$ (T = constant), $p_{ik}(t)$ ($i, k = 1, \dots, n$) are limited and, in the general case, complex functions, and $\lim_{t \rightarrow \infty} p_{ik}^{(m)}(t) = 0$ ($i, k = 1, \dots, n$; $m = 1, \dots, m$) where m is a natural number. The method proposed in the paper is to find asymptotic formulas for partial solutions of the above system which satisfy simple roots of equations $\det |p_{ik}(t) - \lambda \delta_{ik}^m| = 0$ (δ_{ik}^m is the Kronecker delta).

107. Discontinuous Solutions of Systems of Quasilinear Equations

"Finding Discontinuous Solutions of Systems of Quasilinear Equations, Part I," by B. L. Rozhdestvenskii; Moscow, Zhurnal Vychislitel'noy Matematiki i Matematicheskoy Fiziki, Vol. 2, No 6, Nov/Dec 62, pp 1019-1043

The author considers the problem of finding a discontinuous (generalized) solution of a system of 2 quasilinear equations of a hyperbolic type.

$$\frac{\partial u_i}{\partial t} + \frac{\partial}{\partial x} \varphi_i(u, t, x) = f_i(u, t, x), \quad (i = 1, 2), \quad u = \{u_1, u_2\}$$

which satisfy the Cauchy problem with initial conditions $u(0, x) = u^*(x)$.

The generalized (discontinuous) solutions of these equations are found with the aid of the relation

$$\int_C v_i (t, x) dx - \varphi [u(t, x), t, x] dt = \iint_{G_C} f_i [u(t, x), t, x] dt dx \quad (i = 1, 2),$$

which all smooth solutions of the given equations satisfy. The generalized solutions require that this relation hold for the regions G_C , which include the piecewise smooth boundaries C .

The discussion is in three parts: (1) the method of characteristics, (2) the Riemann conditions and limitations on the class of systems of quasilinear equations considered, and (3) description of the method of finding discontinuous solutions of a system of quasilinear equations.

108. Boundary Value Problems for Equations in Hilbert Space

"Boundary Value Problems for an Equation in Hilbert Space" (presented 13 Apr 62 by Academician I. G. Petrovskiy), by S. G. Kreyn and G. I. Kaptev, Voronezh State University; Moscow, Doklady Akademii Nauk SSSR, Vol 146, No 3, 21 Sep 62, pp 535-538

The authors investigate boundary value problems for a second-order differential equation in Hilbert space, of the form

$$\frac{d^2 u}{dt^2} - Au + \lambda B(t)u = 0,$$

where $u(t)$ is the desired function with values in Hilbert space H ; A is a self-conjugate, positively defined operator in H , having a completely continuous inverse; $B(t)$ is a bounded, self-conjugate, positively defined operator in H , dependent in a sufficiently smooth manner on t ; and λ is a parameter.

This study was occasioned by several problems in the theory of periodic wave guides, studied in the work of M. G. Kreyn and G. Ya. Lyubarskiy (Priljadnaya Matematika i Mekhanika, 25, No 1, 1961).

109. Invariant Forms and Structural Equations of Infinite Groups

"A Construction of Invariant Forms and Structural Equations of Infinite Groups" (presented 31 Mar 62 by Academician P. S. Aleksandrov), by L. Ye. Yevtushik, Moscow State University imeni M. V. Lomonosov; Moscow, Doklady Akademii Nauk SSSR, Vol 146, No 1, 1 Sep 62, pp 20-21.

The article concerns an involute system of differential equations

$$\partial_{x^k} x^i = h^i_k (x^1, x^2, x^{a_1}, \dots, x^{a_p}), \dots, \partial_{x^{k_p}} x^i = h^i_{k_1 \dots k_p} (x^1, x^2, x^{a_1}, \dots, x^{a_p})$$

($i, k, \ell = 1, \dots, n$) of order p defining an infinite group of transformations $x^i = \varphi^i (x^k)$. $\partial_{x^{k_1} \dots x^{k_p}} x^i$ are partial derivatives of variables x^i with respect to x^k ;

and x^1, \dots, x^p are parametric derivatives of the 1st to pth order respectively.

$$Y^i = \omega^i(x^k) = x^1 + x^k X^k + \dots + \frac{1}{p!} x_{k+1} x_k x^{k-1} \dots x^{k-p} + \dots$$

is the totality of all transformations which are analytic at the point $x^k = 0$.

The author shows that it is possible to define the group determined by the given system of differential equations as a group of transformations of the variables $x^1, x^{a_1}, \dots, x^{a_{p-1}}$ ($x^k = 0$), leaving the forms $\omega^1, \omega^{a_1}, \dots, \omega^{a_{p-1}}$ invariant.

110. Set of Solutions of parabolic Equations

"Structure of the Set of Solutions to Equations of a parabolic Type" (presented 28 Mar 62 by Academician I. G. Petrovskiy), by M. A. Krasnosel'skiy and P. Ye. Sobolevskiy, Voronezh State University; Moscow, Doklady Akademii Nauk SSSR, Vol 146, No 1, 1 Sep 62, pp 26-29

The authors prove that if a mixed boundary value problem for a parabolic equation has two solutions, then it has a continuum of solutions. Seven theorems are presented in support of this proof.

111. Convergence of Iterational Operations

"A Method of Accelerating the Covergence of Iterational Operations," by I. Marek; Moscow, Zhurnal Vychislitel'noy Matematiki i Matematicheskoy Fiziki, Vol 2, No 6, Nov/Dec 62, pp 963-971

The author presents a method of accelerating the convergence of iterative operations based on a method of L. A. Lyusternik, which he describes. The author's method makes use of "dominant eigenvalues [and] eigenvectors" of linear bounded operators existing in Banach space.

112. Convergence and Summability of Fourier Series

"Convergence and Summability of Fourier Series" (presented by Academician G. S. Chogoshvili 12 Jul 61), by L. V. Zhizhiashvili, Tbilisi State University; Tbilisi, Soobshcheniya Akademii Nauk Gruzinskoy SSR, Vol 29, No 3, Sep 62, pp 257-261

The article is devoted to the study of the summability of double Fourier series of the type $\sum_{k=0}^{\infty} \sum_{j=0}^{\infty} \lambda_{jk} A_{jk}(x, y)$, where

$$\lambda_{jk} = \begin{cases} 1/4, & j = k = 0 \\ 1/2, & j = 0, k > 0, \quad k = 0, j > 0, \\ 0, & j > 0, \quad k > 0, \end{cases}$$

$$A_{jk}(x,y) = a_{jk} \cos jx \cos ky + b_{jk} \sin jx \cos ky + c_{jk} \cos jx \sin ky + d_{jk} \sin jx \sin ky.$$

Several theorems are given which refine and generalize the results of previous works on this subject.

Submitted 12 July 1961.

11.3. Lines of Flow for Vortex in Theory of Functions of a Complex Variable

"Analysis of Lines of Flow for a Vortex in the Theory of Functions of a Complex Variable for Certain Analytic Functions," by Sh. Iomudov, Tashkent State University imeni V. I. Lenin; Ashkhabad, Izvestiya Akademii Nauk Turkmeneskoy SSR: Seriya Fiziko-Tekhnicheskikh, Khimicheskikh i Geologicheskikh Nauk, No 4, 1962, pp 12-20

The author studies a steady-flowing, ideal, non compressible, homogeneous liquid, whose surface flow is considered to "consist of two families: the wing $\Psi(x,y) = c$, the fuselage $z = \theta(\Psi) \int \{ |d\zeta/dF|^2 dF \} + \omega(\Psi)$, where θ and ω are arbitrary functions." The lines of flow are expressed parametrically in the form $x = x(\varphi)$, $y = y(\varphi)$, and $z = z(\varphi)$. $\zeta = r(\cos \theta + i \sin \theta) = x + iy$ is a vector in the complex plane.

The author derives equations for x , y , θ , and ω , for $w = \zeta^N$, $\frac{1}{2}(\zeta + \frac{1}{\zeta})$, $\zeta + \sqrt{\zeta^2 - 1}$, e^{ζ} , $\sin \zeta$, $\cos \zeta$, $\tan \zeta$, $\sinh \zeta$, $\cosh \zeta$, $\operatorname{arcsin} \zeta$, and $\operatorname{arcsinh} \zeta$.

11.4. Existence of Separatrices Going From Saddle Point to Saddle Point

"The Existence of Separatrices Going from a Saddle Point to a Saddle Point" (presented by Academician N. P. Yerugin, Belorussian SSR Academy of Sciences), N. F. Otrökov, Ger'kiy State University; Minsk, Doklady Akademii Nauk BSSR, Vol 6, No 10, Oct 62, pp 620-622

H. Dulac (J. l'École Polytechniques, s. 2, 9, 1904; and Bull. Soc. Math. de France, 51, 1923) determined three types of singular points of a system of differential equations of the form

$$\frac{dx}{dt} = P(x, y), \quad \frac{dy}{dt} = Q(x, y),$$

namely: saddle point-saddle point, saddle point-focus, and saddle point-midpoint. He proved that this classification, not affecting the qualitative character of trajectories in the vicinity of a saddle point, has a fundamental value in the study of integral curves in the large.

In this paper it is shown that in the region where P and Q are single-valued analytic functions the given system of differential equations cannot have a separatrix going from a simple saddle point to the same saddle point if that point is not the midpoint in the Dulac sense and the ratio of the roots of the corresponding characteristic equation is different from 1.

115. Nonlinear Systems of Equations and Method of Integral Manifolds

"The Study of a Nonlinear System of $n+m$ Equations with a Small Parameter by the Method of Integral Manifolds" (presented by Academician Yu. O. Mitropol'skiy, Academy of Sciences Ukrainian SSR), by O. B. Likova, Institute of Mathematics, Academy of Sciences Ukrainian SSR; Kiev, Doklady Akademii Nauk Ukrainskoy SSR, No 10, 1962, pp 1267-1270

The author proves for a system of $n+m$ equations

$$\begin{aligned} dx/dt &= X(x, y) + \varepsilon x^*(t, x, y), \quad dy/dt = \varepsilon y(t, x, y), \\ x &= \{x_1, \dots, x_n\}, \quad y = \{y_1, \dots, y_m\}, \quad X = \{X_1, \dots, X_n\}, \quad X^* = \{X_1^*, \dots, X_n^*\}, \\ Y &= \{Y_1, \dots, Y_m\} \end{aligned}$$

the existence and uniqueness of an $(m+2)$ -dimensional local integral manifold possessing the property of attracting trajectories of any solutions proceeding from points in the neighborhood of the manifold. It is also established that on the manifold the system of $n+m$ equations shown above is reduced to a system of $m+2$ equations.

116. Boundary Properties of Differentiable Functions of Many Variables

"Boundary Properties of Differentiable Functions of Many Variables" (presented 16 Apr 62 by Academician S. L. Sobolev), by S. M. Nikol'skiy, Mathematics Institute imeni V. A. Steklov, Academy of Sciences USSR; Moscow, Doklady Akademii Nauk SSSR, Vol 146, No 3, 21 Sep 62, pp 542-545

The author studies partial derivatives of functions at the boundaries of their defined regions. Several theorems are presented.

117. Periodic Motions of Self-Contained Systems

"Periodic Motions of Certain Self-Contained Systems," by T. F. Lyapunov; Moscow, Izvestiya Akademii Nauk SSSR, Otdeleniye Tekhnicheskikh Nauk: Mekhanika i Mashinostroyeniye, No 5, Sep/Oct 62, pp 129-133

The article concerns a method of determining periodic solutions of a special type of certain nonlinear differential equations. This method is applicable in the design of single-circuit generators of electromagnetic oscillations.

Submitted 5 July 1961.

118. Method for Determining Correlation Function of Normal Random Operations

"A Method for Determining a Correlation Function of Normal Random Operations," by V. F. Nesteruk and N. N. Porfir'yev, Leningrad Shipbuilding Institute; Leningrad, Izvestiya Vysshikh Uchebnykh Zavedeniy: Priborostroyeniye, Vol 5, № 6, 1962, pp 55-57

The article gives a method of finding a correlation function of normal random operations by experimental elimination of normal random operations by experimental elimination of one sign.

Submitted 17 November 1960.

Recommended by the Chair of Physics.

119. Mean Convergence for Densities

"Mean Convergence for Densities," by S. Kh. Sirazhdinov and M. Mamatov, Tashkent State University imeni V. I. Lenin; Moscow, Teoriya Veroyatnostey i yeye Primeneniye, Vol 7, No 4, 1962, pp 433-437

Given that $p_N(x)$ is the probability density of the absolutely continuous component of the distribution of the sum of equally distributed random variables $\xi_1, \xi_2, \dots, \xi_N$, the author studies the asymptotic behavior of the quantity

$$C = \int_{-\infty}^{+\infty} |p_N(x) - \varphi(x)| dx, \text{ where } \varphi(x) = \frac{1}{\sqrt{2\pi}} e^{-\frac{x^2}{2}}$$

120. Analysis of Distributions of Maximum Deviations in Lattice Walk

"An Asymptotic Analysis of Distributions of Maximum Deviations in a Lattice Walk," by V. S. Korolyuk, Institute of Mathematics, Academy of Sciences. Ukrainian SSR; Moscow, Teoriya Veroyatnostey i yeye Primeneniye, Vol 7, No 4, 1962, pp 393-409

An algorithm is described for obtaining asymptotic expansions of distributions of maximum deviations of normalized sums of independent, uniformly distributed, random lattice quantities having finite moments of a fairly high order. Asymptotic analysis of equations having a small parameter is employed.

121. Unions of Strongly Paracompact Spaces

"Unions of Strongly Paracompact Spaces" (presented 30 Mar 62 by Academician P. S. Aleksandrov), by V. Trnka, Karlov University, Prague, Czechoslovakian SSR; Moscow, Doklady Akademii Nauk SSSR, Vol 146 No 1, 1 Sep 62, pp 43-45

The article concerns topological spaces. Several propositions are proven for unions of locally finite systems and paracompact closures.

III. CONFERENCES

122. Symposium on Mathematics and Mechanics in Tbilisi

"Various Briefs"; Baku, Bakinskiy Rabochiy, 1 Dec 62, p 2

The International Union of Theoretical and Applied Mechanics has asked N. I. Muskhelishvili, president of the Georgian Academy of Sciences, to head the organizational committee of the symposium on mathematics and mechanics, convening next year in Tbilisi. According to the article, the Georgian capital was chosen as the location on the basis of the outstanding achievements of Georgian mathematicians in such fields as mathematical physics, mining, flood control, and the theory of elasticity. Muskhelishvili is said to have played a leading part in the development of the latter, and his works have been translated into a number of languages. The Dutch scientist Van Danzing has paid tribute to the school of mathematics, headed by Muskhelishvili.

123. Recent Soviet Conferences in Physics

The conferences listed below were reported or announced in recent issues of Soviet periodicals. Included in the listing are the date and location of the conference, sponsoring organizations, and source. Unless otherwise noted, it is assumed that there was no non-Soviet participation in the conferences.

a. Fifth All-Union Conference on Paleomagnetism; 10-17 June 1962, Krásnoyarsk; sponsored by the Institute of Physics of the Siberian Branch of the Academy of Sciences USSR. (Geologiya i Geofizika, No 9, 1962, p 127)

b. Fourth Conference on Problems of Astrogeology; 7-12 May 1962, Leningrad. (Vestnik Akademii Nauk SSSR, No 11, Nov 62, p 131)

c. First All-Union Conference on Cosmo-Physical Trends in the Investigation of Cosmic Rays; 23-30 August 1962, Yakutsk. (Vestnik Akademii Nauk SSSR, No 11, Nov 62, p 130)

d. Conference on Methods of Photographic Observation of Artificial Earth Satellites; 29 June-2 July 1962, Riga; sponsored by the Astronomical Council of the Academy of Sciences USSR, the Academy of Sciences Latvian SSR, and Riga University. (Vestnik Akademii Nauk SSSR, No 11, Nov 62, p 129).

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7 September 2004

Ms. Roberta Schoen
Deputy Director for Operations
Defense Technical Information Center
7725 John J. Kingman Road
Suite 0944
Ft. Belvoir, VA 22060

Dear Ms. Schoen:

In February of this year, DTIC provided the CIA Declassification Center with a referral list of CIA documents held in the DTIC library. This referral was a follow on to the list of National Intelligence Surveys provided earlier in the year.

We have completed a declassification review of the "Non-NIS" referral list and include the results of that review as Enclosure 1. Of the 220 documents identified in our declassification database, only three are classified. These three are in the Release in Part category and may be released to the public once specified portions of the documents are removed. Sanitization instructions for these documents are included with Enclosure 1.

In addition to the documents addressed in Enclosure 1, 14 other documents were unable to be identified. DTIC then provided the CDC with hard copies of these documents in April 2004 for declassification review. The results of this review are provided as Enclosure 2.

We at CIA greatly appreciate your cooperation in this matter. Should you have any questions concerning this letter and for coordination of any further developments, please contact Donald Black of this office at (703) 613-1415.

Sincerely,

Mary Jakes for

Sergio N. Alcivar
Chief, CIA Declassification Center,
Declassification Review and Referral
Branch

Enclosures:

1. Declassification Review of CIA Documents at DTIC (with sanitization instructions for 3 documents)
2. Declassification Status of CIA Documents (hard copy) Referred by DTIC (with review processing sheets for each document)

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Processing of OGA-Held CIA Documents



The following CIA documents located at DTIC were reviewed
by CIA and declassification guidance has been provided.

OGA Doc ID	Job Num	Box	Fltr	Doc	Doc ID	Document Title	Pub Date	Pages	Decision	Proc Date
AD0333357	78-03117A	187	1	24	4083	Scientific Information Report Organization And Administration Of Soviet Science (6)	12/4/1962	94	Approved For Release	3/29/2004
AD0333955	78-03117A	190	1	20	4197	Scientific Information Report Organization And Administration Of Soviet Science (7)	1/15/1963	100	Approved For Release	3/29/2004
AD0334986	78-03117A	194	1	1	4341	Scientific Information Report Organization And Administration Of Soviet Science (8)	3/5/1963	129	Approved For Release	3/29/2004
AD0335307	78-03117A	196	1	2	4421	Scientific Information Report Organization And Administration Of Soviet Science (9)	3/19/1963	85	Approved For Release	3/29/2004
AD0336305	78-03117A	199	1	14	4550	Scientific Information Report Organization And Administration Of Soviet Science (10)	4/24/1963	99	Approved For Release	3/29/2004
AD0337360	78-03117A	203	1	2	4702	Scientific Information Report Organization And Administration Of Soviet Science (11)	6/13/1963	65	Approved For Release	3/29/2004
AD0338686	78-03117A	205	1	41	4816	Scientific Information Report Organization And Administration Of Soviet Science (12)	7/18/1963	67	Approved For Release	3/29/2004
AD0342004	78-03117A	208	1	24	4913	Scientific Information Report Organization And Administration Of Soviet Science (13)	8/21/1963	89	Approved For Release	3/29/2004
AD0343882	78-03117A	211	1	15	5033	Scientific Information Report Organization And Administration Of Soviet Science (14)	9/24/1963	127	Approved For Release	3/29/2004
AD0343989	78-03117A	213	1	12	5111	Scientific Information Report Organization And Administration Of Soviet Science (15)	10/18/1963	58	Approved For Release	3/29/2004
AD0345283	78-03117A	215	1	21	5180	Scientific Information Report Organization And Administration Of Soviet Science (16)	11/18/1963	61	Approved For Release	3/29/2004
AD0344526	78-03117A	217	1	34	5255	Scientific Information Report Organization And Administration Of Soviet Science (17)	12/24/1963	32	Approved For Release	3/29/2004
AD0347731	78-03117A	222	1	6	5419	Scientific Information Report Organization And Administration Of Soviet Science (19)	2/27/1964	53	Approved For Release	3/29/2004
AD0332259	78-03117A	182	1	34	3907	Scientific Information Report Physics And Mathematics (21)	10/8/1962	58	Approved For Release	3/29/2004
AD0332752	78-03117A	184	1	24	3975	Scientific Information Report Physics And Mathematics (22)	11/1/1962	57	Approved For Release	3/29/2004
AD0334246	78-03117A	187	1	31	4090	Scientific Information Report Physics And Mathematics (23)	12/6/1962	38	Approved For Release	3/29/2004
AD0333956	78-03117A	189	1	33	4171	Scientific Information Report Physics And Mathematics (24)	1/8/1963	38	Approved For Release	3/29/2004
AD0334380	78-03117A	192	1	4	4260	Scientific Information Report Physics And Mathematics (25)	1/31/1963	53	Approved For Release	3/29/2004
AD0335121	78-03117A	195	1	3	4384	Scientific Information Report Physics And Mathematics (26)	3/14/1963	71	Approved For Release	3/29/2004